Signal conversion board for digital I/O

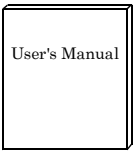
SC-DIO2424S User's Manual

CONTEC CO.,LTD.

Thank you for purchasing the CONTEC product.
The product consists of the items listed below. Check, with the following list, that your package is complete. If you discover damaged or missing items, contact your retailer.

Product Configuration List

- Board…1
- User's Manual…1



User's Manual

Board

⚠ CAUTION

- Use this product in the specified environment (temperature and humidity).
- Do not use or store the product in a location exposed to extremely high or low temperature or susceptible to rapid temperature changes.
  For example: - Do not exposure to direct sunlight
  - In the vicinity of a heat source
- There are jumpers on this product that need to be set in advance.
  Be sure to check these before connecting the cable.
- Only set the jumpers on this product to the specified settings.
  Otherwise, this product may malfunction, overheat, or cause a failure.
- CONTEC will bear no responsibility for any problems, etc., resulting from modifying this product.
- When carrying the product, be careful not to apply direct vibration or shock to the product.
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About the Product

Signal Conditioner SC Series can reduce the type and number of measurement / control board of PC side by converting the signal and circuit being coexisted by the signal and circuit spec. when measuring and controlling with multiple external devices.
You can easily build the system without the original circuit by using the Signal Conditioner SC Series conversion board.

This product is a signal conversion board for the Signal Conditioner (signal conversion) SC Series digital I/O. You can convert the digital input / output signal on the external device (12 - 24VDC) into TTL level signal (5VDC) and input / output to / from the PC (digital I/O board). As for the output 24 channels on the external device, current sink / source is set with jumpers in 8 channels and the input 24 channels on the external device corresponds to both the current sink and source (1 common in 8 channels).

Features

- **Output 24 channels on the external device can set the current sink / source in 8 channels.**

Output 24 channels on the external device can set the current sink / source in 8 channels in accordance with the external device. Switching the current sink / source can be done using the jumper.

- **Input 24 channels on the external device corresponds to both the current sink and source (1 common in 8 channels).**

Digital input on the external device corresponds to both the current sink and source (1 common in 8 channels).

- **Output circuits from conversion board to external device include zener diodes for surge voltage protection and poly-switches for overcurrent protection.**

Zener diodes are connected to the output circuits from conversion board to external device to protect against surge voltages. Similarly, polyswitches are fitted to each group of 8 channels outputs for over-current protection. The output rating is 100mA at a maximum of 35VDC per ch.

⚠ CAUTION

The digital I/O board to be connected with this product should be set to 24 channels digital inputs (A00 - A48) and 24 channels digital outputs (B00 - B48).
Using it with other settings will result in malfunction, overheating, or failure.

Setup Hardware

Name of each parts

Figure 1 shows the names of major parts on the board.

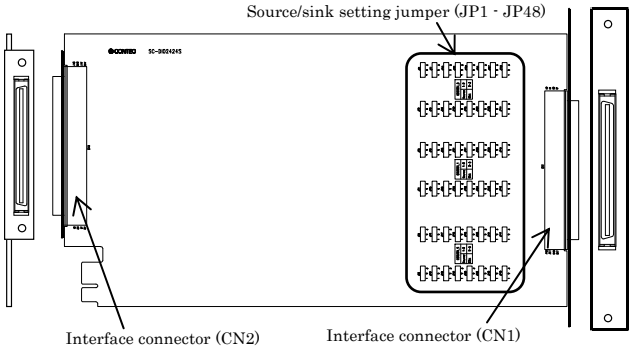


Figure 1. Component Locations

CN1 : The connector that connects with the external device side.
CN2 : The connector that connects with the PC (digital I/O board) side.

Setting Method

Setting method of current sink / source

Setting the current sink / source is different in the way of output and input. In case of the output, setting can be done switching the jumpers and the input, you do not have to set it. 1 common in 8 channels

For setting the current sink / source, configure the jumper according to the table below.

Source	Sink
 1 2 3 1 - 2 short (Factory setting)	 1 2 3 2 - 3 short

Configure the following corresponding jumpers as indicated in the table above. Ensure that all of the 16 jumpers are set to the same.

Digital Output 00 - Digital Output 07	JP1	JP7	JP13	JP19	JP25	JP31	JP37	JP43
	JP2	JP8	JP14	JP20	JP26	JP32	JP38	JP44
Digital Output 08 - Digital Output 15	JP3	JP9	JP15	JP21	JP27	JP33	JP39	JP45
	JP4	JP10	JP16	JP22	JP28	JP34	JP40	JP46
Digital Output 16 - Digital Output 23	JP5	JP11	JP17	JP23	JP29	JP35	JP41	JP47
	JP6	JP12	JP18	JP24	JP30	JP36	JP42	JP48

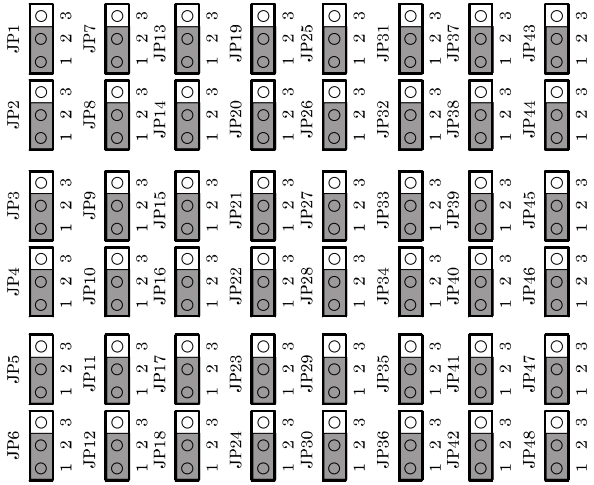


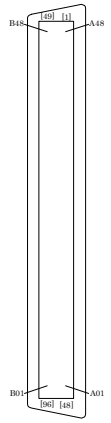
Figure 2. Setting method of current sink / source

Connect a Board/Card

Connector Pin Assignment on External Device (CN1)

Pin Assignments of Interface Connector (CN1)

N.C	B48		A48	N.C
N.C	B47		A47	N.C
N.C	B46		A46	N.C
N.C	B45		A45	N.C
Output minus common 2	B44		A44	N.C
Output minus common 2	B43		A43	N.C
Digital Output 23	B42		A42	Digital Input 23
Digital Output 22	B41		A41	Digital Input 22
Digital Output 21	B40		A40	Digital Input 21
Digital Output 20	B39		A39	Digital Input 20
Digital Output 19	B38		A38	Digital Input 19
Digital Output 18	B37		A37	Digital Input 18
Digital Output 17	B36		A36	Digital Input 17
Digital Output 16	B35		A35	Digital Input 16
Output plus common 2	B34		A34	Input common 2
Output plus common 2	B33		A33	Input common 2
N.C	B32		A32	N.C
N.C	B31		A31	N.C
N.C	B30		A30	N.C
N.C	B29		A29	N.C
Output minus common 1	B28		A28	N.C
Output minus common 1	B27		A27	N.C
Digital Output 15	B26		A26	Digital Input 15
Digital Output 14	B25		A25	Digital Input 14
Digital Output 13	B24		A24	Digital Input 13
Digital Output 12	B23		A23	Digital Input 12
Digital Output 11	B22		A22	Digital Input 11
Digital Output 10	B21		A21	Digital Input 10
Digital Output 09	B20		A20	Digital Input 09
Digital Output 08	B19		A19	Digital Input 08
Output plus common 1	B18		A18	Input common 1
Output plus common 1	B17		A17	Input common 1
N.C	B16		A16	N.C
N.C	B15		A15	N.C
N.C	B14		A14	N.C
N.C	B13		A13	N.C
Output minus common 0	B12		A12	N.C
Output minus common 0	B11		A11	N.C
Digital Output 07	B10		A10	Digital Input 07
Digital Output 06	B09		A09	Digital Input 06
Digital Output 05	B08		A08	Digital Input 05
Digital Output 04	B07		A07	Digital Input 04
Digital Output 03	B06		A06	Digital Input 03
Digital Output 02	B05		A05	Digital Input 02
Digital Output 01	B04		A04	Digital Input 01
Digital Output 00	B03		A03	Digital Input 00
Output plus common 0	B02		A02	Input common 0
Output plus common 1	B01		A01	Input common 0



The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

Figure 3. Pin Assignments of Interface Connector (CN1) *< 1 / 2 >*

Digital Input 00 - Digital Input 23	Digital input signal. The numbers correspond to input signal numbers.
Digital Output 00 - Digital Output 23	Digital output signal. The numbers correspond to output signal numbers.
Input common 0 - Input common 2	Input common. They are common to the 8 channels each.
Output plus common 00 - Output plus common 02	Output plus common. They are common to the 8 channels each.
Output minus common 00 - Output minus common 02	Output minus common. They are common to the 8 channels each.
N.C.	No connection to this pin.

Figure 3. Pin Assignments of Interface Connector (CN1) < 2/2 >

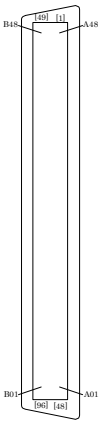
⚠ CAUTION

- There is a difference in pin assignments between CN1 and CN2 so you need to connect the cable carefully. If you do not so, it may cause failure.
- Avoid causing a short-circuit by connecting the outputs with any of the common channels. Also, do not connect the outputs to each other.
  Otherwise, this product may cause a failure.

Connector Pin Assignment on Digital I/O Board (CN2)

Pin Assignments of Interface Connector (CN2)

Digital Output 23	B48	A48	Digital Input 23
Digital Ground	B47	A47	Digital Ground
Digital Output 22	B46	A46	Digital Input 22
Digital Ground	B45	A45	Digital Ground
Digital Output 21	B44	A44	Digital Input 21
Digital Ground	B43	A43	Digital Ground
Digital Output 20	B42	A42	Digital Input 20
Digital Ground	B41	A41	Digital Ground
Digital Output 19	B40	A40	Digital Input 19
Digital Ground	B39	A39	Digital Ground
Digital Output 18	B38	A38	Digital Input 18
Digital Ground	B37	A37	Digital Ground
Digital Output 17	B36	A36	Digital Input 17
Digital Ground	B35	A35	Digital Ground
Digital Output 16	B34	A34	Digital Input 16
Digital Ground	B33	A33	Digital Ground
Digital Output 15	B32	A32	Digital Input 15
Digital Ground	B31	A31	Digital Ground
Digital Output 14	B30	A30	Digital Input 14
Digital Ground	B29	A29	Digital Ground
Digital Output 13	B28	A28	Digital Input 13
Digital Ground	B27	A27	Digital Ground
Digital Output 12	B26	A26	Digital Input 12
Digital Ground	B25	A25	Digital Ground
Digital Output 11	B24	A24	Digital Input 11
Digital Ground	B23	A23	Digital Ground
Digital Output 10	B22	A22	Digital Input 10
Digital Ground	B21	A21	Digital Ground
Digital Output 09	B20	A20	Digital Input 09
Digital Ground	B19	A19	Digital Ground
Digital Output08	B18	A18	Digital Input 08
Digital Ground	B17	A17	Digital Ground
Digital Output 07	B16	A16	Digital Input 07
Digital Ground	B15	A15	Digital Ground
Digital Output 06	B14	A14	Digital Input 06
Digital Ground	B13	A13	Digital Ground
Digital Output 05	B12	A12	Digital Input 05
Digital Ground	B11	A11	Digital Ground
Digital Output 04	B10	A10	Digital Input 04
Digital Ground	B09	A09	Digital Ground
Digital Output 03	B08	A08	Digital Input 03
Digital Ground	B07	A07	Digital Ground
Digital Output 02	B06	A06	Digital Input 02
Digital Ground	B05	A05	Digital Ground
Digital Output 01	B04	A04	Digital Input 01
Digital Ground	B03	A03	Digital Ground
Digital Output 00	B02	A02	Digital Input 00
Digital Ground	B01	A01	Digital Ground



The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

Figure 4. Pin Assignments of Interface Connector (CN2) < 1/2 >

Digital Input 00 - Digital Input 23	Digital input signal. The numbers correspond to input signal numbers.
Digital Output 00 - Digital Output 23	Digital output signal. The numbers correspond to output signal numbers.
Digital Ground	Digital ground for digital I/O signal.

Figure 4. Pin Assignments of Interface Connector (CN2) < 2/2 >

⚠ CAUTION

- There is a difference in pin assignments between CN1 and CN2 so you need to connect the cable carefully. If you do not so, it may cause failure.
- The signal names on the CN2 correspond to those on the CN1. Therefore, the input signals on the CN2 are actually the output signals from the CN1, and the output signals are the CN1 input signals.
- The digital I/O board to be connected with this product should be set to 24 channels digital inputs (A00 - A48) and 24 channels digital outputs (B00 - B48).
  Otherwise, this product may malfunction, overheat, or cause a failure.
- The output must not be short-circuited with the digital ground. Also, do not connect the outputs to each other. Otherwise, this product may cause a failure.

Inserting to the box for the signal conversion board

Insert this product referring to the documentation of the box for the signal conversion boards.

Board/Card Connection

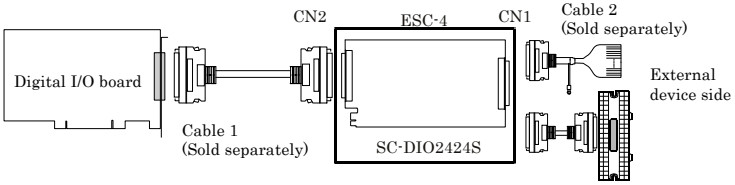


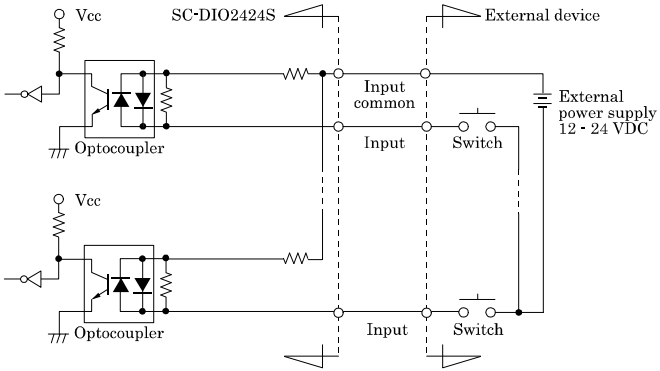
Figure 5. Connecting to the board

Connecting Input Signals

Connect the input signals to a device which can be current-driven, such as a switch or transistor output device.
The connection requires an external power supply to feed currents.
This product inputs the ON/OFF state of the current-driven device as a digital value.

Input Circuit

< Corresponding to the current sink output >



< Corresponding to the current source output >

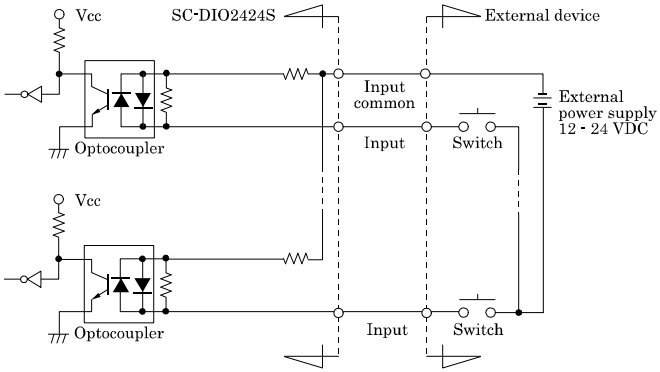
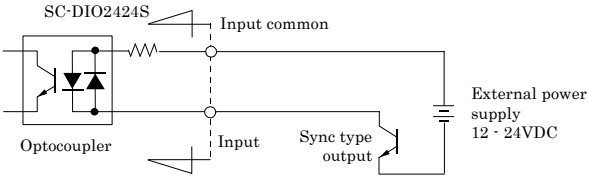


Figure 6. Input Circuit

The input circuits of interface blocks of this product are illustrated in figure 6. 1 common in 8 channels. The signal inputs are isolated by Optocoupler (Corresponding to both of current sink and source outputs). This product therefore requires an external power supply to drive the inputs. The power capacity required for driving each input channel is about 4 mA (with the 12 - 24 VDC setting).

Connection Example of External Device

< Corresponding to current sink output >

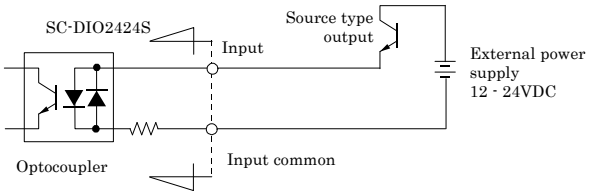


When the input is "low level", the corresponding bit contains 1.

When the input is "high level", by contrast, the corresponding bit contains 0.

Figure 7. Connecting the input to the sink type output

< Corresponding to current source output >



When the input is "low level", the corresponding bit contains 0.

When the input is "high level", by contrast, the corresponding bit contains 1.

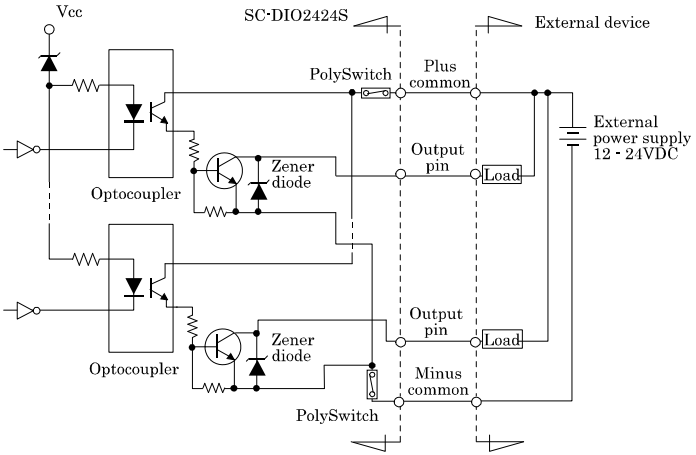
Figure 8. Connecting the input to the source type output

Connecting Output Signals

Connect the output signals to a current-driven controlled device such as a relay or LED.
The connection requires an external power supply to feed currents.
This product controls turning on/off the current-driven controlled device using a digital value.

Output Circuit

< Current sink output >



< Current source output >

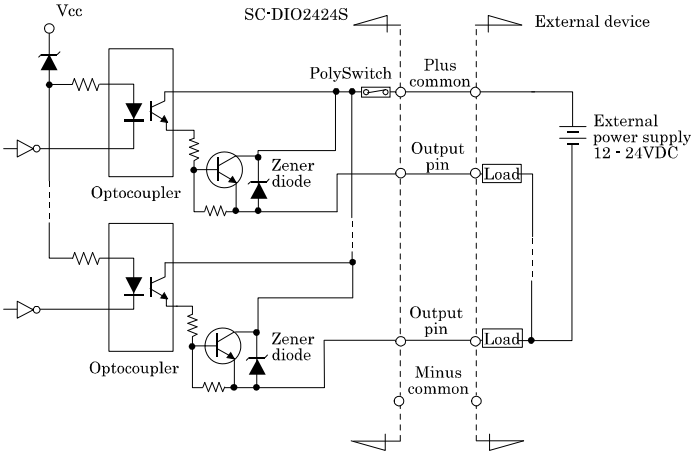


Figure 9. Output Circuit

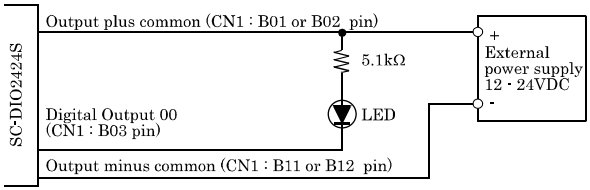
The output circuits of interface blocks of this product are illustrated in figure 9. 1 common in 8 channels. The signal output section is an Optocoupler isolated output and according to the external device, current sink / source output is set with jumpers. Driving the output section requires an external power supply (12 - 24VDC) separately. The rated output current per channel is Max. 100mA.
A zener diode is connected to the output transistor for protection from surge voltages.
A PolySwitch-based overcurrent protector is provided for every 8 output transistors. When the overcurrent protector works, the output section of this product is temporarily disabled. If this is the case, turn of the power to the PC and the external power supply and wait for a few minutes, then turn them on back.

⚠ CAUTION

When the PC is turned on, all output are reset to OFF.

Connection to the LED

< Current sink output >

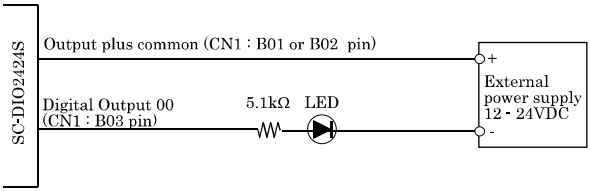


When 1 is output to a relevant bit, the corresponding LED is comes on.

When 0 is output to a relevant bit, by contrast, the corresponding LED is goes out.

Figure 10. An Example to use Digital Output 00 < Current sink output >

< Current source output >



When 1 is output to a relevant bit, the corresponding LED is comes on.

When 0 is output to a relevant bit, by contrast, the corresponding LED is goes out.

Figure 11. An Example to use Digital Output 00 < Current source output >

Correspondence Products (Optional)

DIO-48D-PE*1, DIO-48D-LPE*2, DIO-48D2-PCI*1, PIO-48D(PCI)*1, PIO-48D(LPCI)H*2, PIO-48D(CB)H*2

*1 PCB96PS-0.5P, PCB96PS-1.5P optional cable is required separately.

*2 DIO-68M/96F optional cable is required separately.

Box (Optional)

Box for signal conversion board : ESC-4 *1

*1 ESC-4 is required to use this product.

Cables (Optional)

< External device side (CN1) and digital I/O board side (CN2) >
Shield Cable with 96-Pin Half-Pitch Connectors at both Ends

: PCB96PS-0.5P (0.5m) *1
: PCB96PS-1.5P (1.5m) *1
: PCB96PS-3P (3m) *1,
: PCB96PS-5P (5m) *1

< External device side (CN1) >
Shield Cable with One 96-Pin Half-Pitch Connector

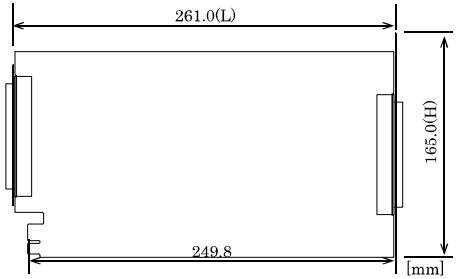
: PCA96PS-0.5P (0.5m)
: PCA96PS-1.5P (1.5m)
: PCA96PS-3P (3m)
: PCA96PS-5P (5m)

< Digital I/O board side (CN2) >
Shielded Cable for CardBusDigital I/O Card

: DIO-68M/96F (0.5m)

*1 As for the cable to be connected to the digital I/O side (CN2), use one within 1.5 m.

Physical Dimensions



- The (L) of the physical dimensions corresponds to the length from the outer surface of the slot cover to the outside of the opposite slot cover.
- The (H) of the physical dimensions corresponds to the length between the upper and the lower ends of the slot cover.

Figure 12. Physical Dimensions

Specifications

Table 1. Specifications

Item		Specification
External device side (CN1)		
	Digital input spec.	Optocoupler isolated input 24 channel (Corresponding to current sink / current source, 12 - 24VDC, 1 common in 8 channels) Corresponding to current sink output : negative logic *1 Corresponding to current source output : positive logic *2 Input resistance : 4.7kΩ Input ON current : 3.1mA or more Input OFF current : 1.0mA or less
	Digital output spec.	Optocoupler isolated output 24 channel (Current sink (open-collector) / current source is set with jumper, 12 - 24VDC, 1 common in 8 channels) Current sink output : negative logic *1 Current source output : positive logic *2 Output rating : Max. 35V 100mA (per ch)
Digital I/O board side (CN2) *4		
	Board input spec.	Unisolated TTL level (Positive logic)
	Board output spec.	Unisolated TTL level (Positive logic)
Common section		
	Response time	200μsec (Max.) *3
	External power supply	12 - 24VDC (±10%)
	Connector	96-pin half pitch connector [F(Female)type] x 2 PCR-E96LMD+ [HONDA TSUSHIN KOGYO CO., LTD.] or equivalence to it
	Operating conditions	0 - 50ºC, 20 - 80%RH (No condensation)
	Allowable distance of signal extension	Approx. 50m (depending on wiring environment)
	Current consumption	5VDC 150mA
	Physical Dimensions (mm)	261(L) x 165(H) (No protrusions)
	Weight	260g

*1: Data "0" and "1" correspond to the High and Low levels, respectively.

*2: Data "1" and "0" correspond to the High and Low levels, respectively.

*3: There will be 200μsec of delay at maximum when a signal passes through this product.

*4: The digital I/O board to be connected with this product should be set to 24 channels digital inputs (A00 - A48) and 24 channels digital outputs (B00 - B48).

SC-DIO2424S

User's Manual

CONTEC CO., LTD.

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Management No. A-51-632

Parts No. LYJX022